

STUDIES ON INDIANA STONEFLIES (PLECOPTERA), WITH AN ANNOTATED AND REVISED STATE CHECKLIST

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Abstract.—An historical account of taxonomic-based Indiana Plecoptera research is presented and current distribution records are provided for 76 species, including 17 new state records. Six species, *Allocapnia minima* (Newport), *Allocapnia pygmaea* (Burmeister), *Leuctra tenella* (Provancher), *Alloperla atlantica* (Baumann), *Alloperla imbecilla* (Say), and *Sweltsa naica* (Provancher), are removed from the state list. Distribution records are based on recent collections, examination of museum material, and credible literature.

Key Words: stoneflies, Plecoptera, Indiana, species, hydrologic unit codes

The stonefly fauna of Indiana received considerable attention during the 20th century. Ricker (1945) published the first list of Indiana stoneflies. Ricker's list included 38 species, gleaned mainly from collections housed at Indiana University and Purdue University (PU) and efforts of the Illinois Natural History Society (INHS) during the late 1930's and early 1940's. Frison (1937, 1942) conducted numerous studies on Indiana Plecoptera and frequent collecting sites included McCormick's Creek, Shades, and Turkey Run State Parks, and both the East Fork and mainstem of the White River. *Acroneuria perplexa* has "White River, Petersburg" as the type locality (Frison 1937). The descriptions of five additional species, *Allocapnia rickeri*, *Isoperla dicala*, *I. namata*, and *Taeniopteryx lita* (Frison 1942), and *I. frisoni* (described as *I. truncata*) (Frison 1937), included paratype localities in Indiana. Ricker (1952) later included descriptions of three species, *Allocapnia indianae*, *Amphinemura delosa* (described as *Nemoura* (A.) *delosa*), and *A. varshava* (described as *N.* (A.) *varshava*), each with an Indiana stream as the type locality.

Further studies by Ricker and Ross during the 1960's on *Allocapnia* and *Taeniopteryx* furthered the knowledge of the Indiana fauna. Numerous paratype localities in Indiana were included in the description of *A. ohioensis* (Ross and Ricker 1964). Similarly, Ricker and Ross (1968) included paratype localities from Indiana in descriptions of *T. burksi* and *T. metequi*. Later, Stark and Gaufin (1974) cited Turkey Run State Park as a paratype locality for *Diploperla robusta* and Stark and Baumann (1978) cited Clifty Falls State Park as a paratype locality for *Neoperla gaufini*.

The most recent compilation of Indiana Plecoptera (Bednarik and McCafferty 1977) increased the number of Indiana species to 61. Their study, similar to Ricker's (1945), was mainly museum- and literature-based. Lastly, the most recent checklist of North American Plecoptera included 62 species for Indiana (Stark 2001). The intent of this study was two-fold: (1) review the literature and selected museum material regarding prior state records, and (2) document the diversity and distribution of Indiana stone-

flies with a particular focus directed at unglaciated landscapes. Indiana can be conveniently split into two components, the central and northern sections that were repeatedly covered and scoured by glacial advances and retreats and the smaller southern unit that escaped all glacial episodes (Fig. 1). The Indiana fauna was delineated according to six-digit hydrologic unit codes.

MATERIALS AND METHODS

Collecting trips were made to southern Indiana from 2000 through 2003. Frequent collecting sites included springs and intermittent streams in Hoosier National Forest and Indiana State Nature Preserves, and the Wabash, Blue, and East Fork White Rivers. In total 88 unique sites were visited at least once (Fig. 2), producing 151 collections and 361 vials of fresh material. Adults were collected with a beating sheet within riparian zones, by visually searching tree trunks, streamside rocks, snags and bridges (particular for Capniidae and Taeniopterygidae), and light-trapping for summer-emerging Perlidae. Adults were also reared from nymphs in an artificial stream unit. All new material was deposited in the S. A. Grubbs collection at Western Kentucky University.

Distribution data was included based on museum material (INHS and PU) and literature, the latter based on Bednarik and McCafferty (1977), Finni (1973a, b), Frison (1937, 1942), Kondratieff and Baumann (2000), Kondratieff et al. (1988), Nelson and Hanson (1971), Ricker (1945, 1952, 1965), Ricker and Ross (1968, 1969), Ross and Ricker (1964, 1971), Stark (1986, 2002), Stark and Baumann (1978), Stark and Gaufin (1974, 1976), Stark and Szczytko (1981), Stark et al. (1986), Stewart and Stark (2002), and Szczytko and Stewart (1978, 1981). No distinction was made between "historical" and "recent" records.

RESULTS

Stoneflies have been recorded from 9 of 10 hydrologic unit codes located in Indiana (Table 1). The Patoka-White (58 species),

Lower Ohio-Salt (47 species), and Wabash (36 species) units supported the highest diversity. As a conservative number 76 stonefly species are recorded from Indiana, including 17 new state records. More specifically, 14 new records are based on material collected solely by the author and three based on a combination of the author's and museum records. The following is a partially annotated, revised checklist of stoneflies reported from Indiana, where "*" indicates the new records. Records have been limited to counties only if a species had been listed previously from the state. Where a new state record is presented one detailed county record is provided. Future collecting will likely provide additional species to the state list, and these 18 taxa are marked by "+" followed by parentheses indicating the adjacent state(s) or region (OO = Ozark-Ouachita) where that species has been collected.

ANNOTATED LIST OF STONEFLIES FROM INDIANA

Suborder Euholognatha

Family Nemouridae

Subfamily Amphinemurinae

Amphinemura delosa (Ricker).—Crawford, Dearborn, Floyd, Franklin, Harrison, Jackson, LaPorte, Lawrence, Marion, Montgomery, Owen, Perry, Ripley, Switzerland.

Amphinemura nigritta (Provancher).—Although Bednarik and McCafferty (1977), Stark (2001) and Stewart and Stark (2002) listed this species from Indiana, no literature records or museum material have been located and fresh specimens have not been collected. *Amphinemura nigritta* is widely distributed throughout eastern North America, including Illinois, Kentucky, and Ohio. This state record is retained until a definitive determination can be made.

Amphinemura varshava (Ricker).—Bartholomew, Clark, Floyd, Harrison, Jackson, Jefferson, Kosciusko, Lawrence, Monroe, Ohio, Owen, Parke, Perry, Pike, Ripley.

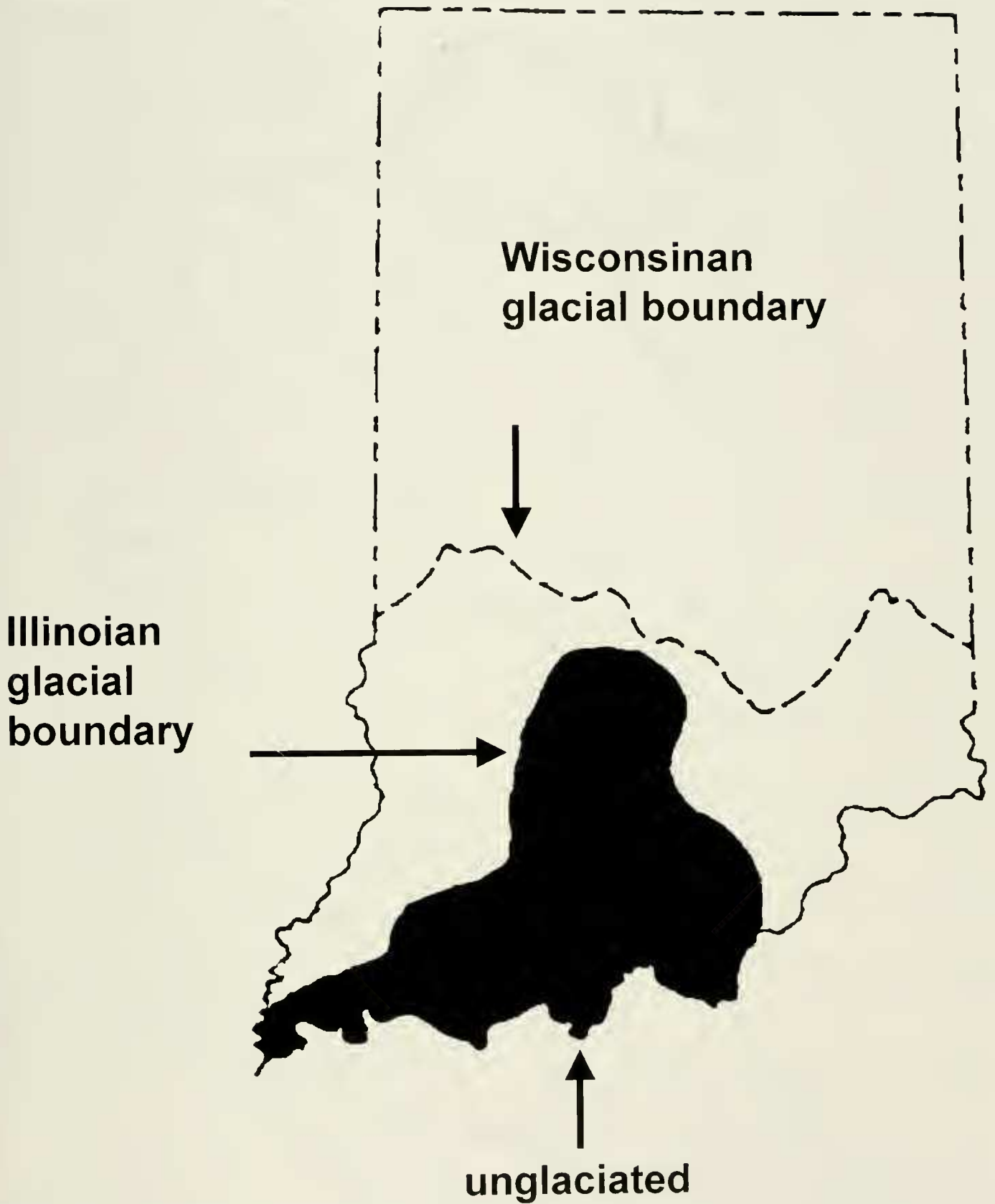


Fig. 1. Map of Indiana depicting southern extent of the Illinoian and Wisconsin glacial episodes and the south-central region that remained ice-free.

This species is a common inhabitant of intermittent streams in southern Indiana.

Subfamily Nemourinae

- + *Nemoura trispinosa* Claassen (IL, MI)
- * *Ostrocerca truncata* (Walker).—Clark

Co., seep into Fourteenmile Creek, nr. Charlestown, Charlestown State Park, 17 May 2000, SAG, 2 ♀; Crawford Co., tributary to Otter Creek, 1 km SE Taswell, Yellow Birches Ravine Nature Preserve (YBRNP), 22 April 2001, SAG and D. E.

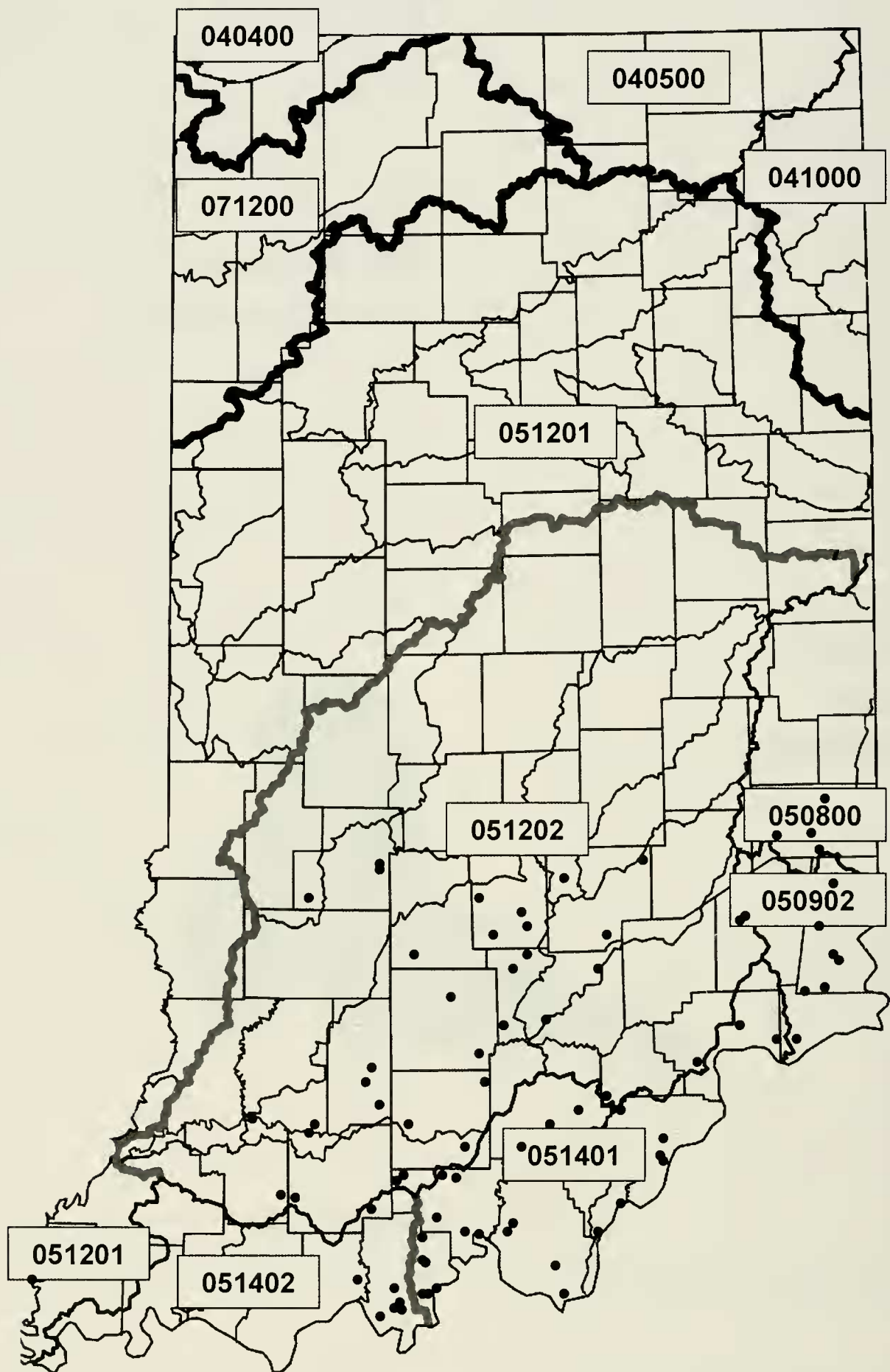


Fig. 2. Map of Indiana showing collection sites visited between 2000 and 2003 in relation to six-digit hydrologic unit codes. 040400 = Southwestern Lake Michigan, 040500 = Southeastern Lake Michigan, 041000 = Western Lake Erie, 050800 = Great Miami, 050902 = Middle Ohio-Little Miami, 051201 = Wabash, 051202 = Patoka-White, 051401 = Lower Ohio-Salt, 051402 = Lower Ohio, and 071200 = Upper Illinois.

King-Grubbs (DEG), 1 ♂, 1 ♀; Harrison Co., tributary to Potato Run, 6 km E Leavenworth, Harrison-Crawford State Forest (HCSF), 22 April 2001, SAG and DEG, 3 ♂, 4 nymphs; Perry Co., small spring-fed stream, Rich Cave Hollow, 2.5 km N Branchville, Saalman Hollow Nature Preserve (SHNP), 22 April 2001, SAG and DEG, 2 ♂, 1 ♀. Although the distribution of the eastern North American species of *Ostrocerca* is mainly Appalachian (Young et al. 1989), this species is a common inhabitant of spring-fed streams in south-central Indiana.

* *Prostoia completa* (Walker).—Crawford Co., Little Blue River, 3 km N Sulphur, Hoosier National Forest (HNF), 12 March 2000, SAG and J. M. Ferguson (JMF), 1 ♂; Jackson Co., Guthrie Creek, 18 km E Bedford, Hemlock Bluff Nature Preserve (HBNP), 14 March 2000, SAG and JMF, 3 ♂, 2 ♀.

Prostoia similis (Hagen).—Brown, Jackson, Parke.

+ *Shipsa rotunda* (Claassen) (IL, MI, OO).

Soyedina vallicularia (Wu).—Crawford, Monroe, Montgomery, Tippecanoe.

Family Taeniopterygidae Subfamily Brachypterainae

Strophopteryx fasciata (Burmeister).—Bartholomew, Benton, Carroll, Hancock, Henry, Jackson, Johnson, Knox, Lawrence, Martin, Monroe, Morgan, Owen, Pike, Starke, Tippecanoe, Washington, White.

Subfamily Taeniopteryginae

Taeniopteryx burksi Ricker & Ross.—Bartholomew, Carroll, Cass, Daviess, Dearborn, Dubois, Fountain, Grant, Greene, Hamilton, Huntington, Jackson, Jasper, Jennings, Johnson, Knox, Kosciusko, Lawrence, Monroe, Montgomery, Morgan, Newton, Orange, Owen, Perry, Pike, Posey, Rush, Tippecanoe, Wabash, Warren, Washington, White.

Taeniopteryx lita Frison.—Daviess, Dubois, Martin, Pike.

Taeniopteryx maura (Pictet).—Greene, Hamilton, Harrison, Jackson, Orange, Pike, Washington.

Taeniopteryx metequi Ricker & Ross.—Lawrence, Orange.

Taeniopteryx nivalis (Fitch)—Kosciusko, Martin, Parke.

Taeniopteryx parvula Banks.—Dubois, Greene, Jackson, Martin, Monroe, Pike.

Family Capniidae

Allocapnia forbesi Frison.—Crawford, Dearborn, Floyd, Jackson, Ohio, Perry.

Allocapnia granulata (Claassen).—Bartholomew, Decatur, Fountain, Hamilton, Hancock, Hendricks, Henry, Jackson, Johnson, Kosciusko, Morgan, Montgomery, Parke, Pike, Putnam, Rush, Tippecanoe, Washington.

Allocapnia illinoensis Frison.—Although Finni (1973a), Bednarik and McCafferty (1977) and Stewart and Stark (2002) listed this species from Indiana, no literature records (e.g., Ricker and Ross 1971) or museum material have been located and fresh specimens have not been collected. This state record is retained until a definitive determination can be made.

Allocapnia indianae Ricker.—Brown, Crawford, Jackson, Lawrence, Monroe, Morgan, Perry.

Allocapnia mystica Frison.—Brown, Dubois, Jackson, Orange, Parke, Perry, Washington.

Allocapnia nivicola (Fitch).—Crawford, Lawrence, Martin, Montgomery, Morgan, Orange.

Allocapnia ohioensis Ross & Ricker.—Brown, Jackson, Monroe, Morgan, Scott.

Allocapnia recta (Claassen).—Clark, Crawford, Floyd, Fountain, Harrison, Martin, Montgomery, Morgan, Orange, Parke, Perry, Washington.

Allocapnia rickeri Frison.—Bartholomew, Brown, Clark, Crawford, Dearborn, Dubois, Franklin, Harrison, Jackson, Jefferson, Lawrence, Martin, Monroe, Montgomery, Orange, Owen, Parke, Perry, Ripley, Spencer, Switzerland, Washington.

* *Allocapnia smithi* Ross & Ricker.—Perry Co., East Deer Creek, 13 km E Tell City, HNF, 12 March 2000, SAG and JMF, 1 ♂. This species occupies a narrow distributional range in eastern North America, with prior state records from Alabama, Illinois, Kentucky, and Ohio.

Allocapnia vivipara (Claassen).—Adams, Bartholomew, Boone, Brown, Crawford, Daviess, Dearborn, Decatur, Fountain, Franklin, Hamilton, Hendricks, Henry, Jackson, Jefferson, Lawrence, Marion, Martin, Monroe, Montgomery, Ohio, Orange, Owen, Parke, Pike, Putnam, Ripley, Tippecanoe, Vermillion, Washington.

Nemocapnia carolina Banks.—Martin, Pike. This species is spottily distributed across eastern North America. Collections made by INHS in 1936 and 1940 from the East Fork White River in Martin and Pike counties represent the only Indiana records for this species. Recent trips to the East Fork White River near Rogers have failed to produce fresh material.

+ *Paracapnia angulata* Hanson (IL, MI, OO).

Family Leuctridae

+ *Leuctra ferruginea* (Walker) (IL, KY, MI, OH).—Material housed at the INHS labeled as *L. decepta*, but indicated electronically as *L. ferruginea* (INHS 2002), are actually of *L. rickeri* James. Continued collecting may reveal populations of this ubiquitous species.

* *Leuctra rickeri* James.—Clark Co., tributary to Nine Penny Branch, Fourteen-mile Creek, 4 km NE Charlestown, Nine Penny Branch Nature Preserve (NPBPNP), 17 May 2000, SAG, 2 ♂; Crawford Co., small spring-fed stream, Rich Cave Hollow, 2.5 km N Branchville, SHNP, 16 May 2000, SAG, 14 ♂, 11 ♀; Floyd Co., tributary to Knob Creek, 17 km E Corydon, Brock Sampson Nature Preserve (BSNP), 17 May 2000, SAG 3 ♂, 3 ♀; Harrison Co., tributary to Potato Run, 6 km E Leavenworth, HCSF, 16 May 2000, SAG, 3 ♂, 2 ♀; Jackson Co., tributary to Little Salt Creek, 2 km

SW Houston, HNF, 11 June 2000, SAG, 3 ♂, 7 ♀; Jefferson Co., tributary to Indian Kentuck Creek, 12 km W Vevay, Splinter Ridge Fish and Wildlife Area, 10 June 2000, SAG, 2 ♂, 5 ♀; Monroe/Morgan Co., 7 mi Martinsville, Morgan-Monroe State Forest, 16 May 1962, H. H. Ross and J. Kingsolver, 2 ♂, 10 ♀ (INHS); Perry Co., East Deer Creek, 13 km E Tell City, HNF, 16 May 2000, SAG, 12 ♂, 10 ♀; Ripley Co., tributary to Laughery Creek, 2 km E Versailles, 11 May 2003, SAG, 2 ♂. *Leuctra rickeri* is the most common *Leuctra* in southern Indiana, particularly in intermittent streams.

Leuctra sibleyi Claassen.—Brown, Crawford, Harrison, Lawrence, Monroe, Ohio, Orange, Perry.

* *Leuctra tenuis* (Pictet).—Harrison Co., tributary to West Fork Mosquito Creek, 4 km E Laconia, Mosquito Creek Nature Preserve, 20 October 2002, SAG, 3 ♂, 4 ♀.

Paraleuctra sara Claassen.—Crawford Co., tributary to Otter Creek, 1 km SE Tasswell, YBRNP, 14 March 2000, SAG and JMF, 12 ♂, 5 ♀; Parke Co., Newby Gulch, Turkey Run State Park (TRSP), 9 April 1940, Frison and Ross, 1 ♂ (INHS). The Turkey Run State Park record was documented by Frison (1942) under *Leuctra sara*. This species mainly has a widespread Appalachian distribution and these records likely represent the western limit of its range.

Zealeuctra claasseni (Frison).—Brown, Clark, Crawford, Dearborn, Dubois, Franklin, Jackson, Jefferson, Monroe, Morgan, Ohio, Parke, Perry, Pike, Spencer.

* *Zealeuctra fraxina* Ricker & Ross.—Brown Co., Spanker Branch, Middle Fork Salt Creek, 14 km S Nashville, 7 April 2001, SAG and DEG, 1 ♂, 4 ♀; Crawford Co., small spring-fed stream, Rich Cave Hollow, 2.5 km N Branchville, SHNP, 12 March 2000, SAG and JMF, 4 ♂, 4 ♀, 1 nymph; Floyd Co., tributary to Knob Creek, 17 km E Corydon, BSNP, 13 March 2000, SAG and JMF, 1 ♂, 3 ♀; Harrison Co., tributary to Potato Run, 6 km E Leav-

enworth, HCSF, 12 March 2000, SAG and JMF, 1 ♂; Martin Co., tributary to Lost River, 4 km SE Shoals, 6 April 2001, SAG and DEG, 2 ♂, 9 ♀; Orange Co., spring into French Lick Creek, 6 km S French Lick, 6 April 2001, SAG and DEG, 1 ♀; Perry Co., East Deer Creek, 13 km E Tell City, HNF, 12 March 2000, SAG and JMF, 2 ♂, 1 ♀; Scott Co., tributary to Big Ox Creek, 14 km SW Scottsburg, CSF, 15 March 2000, SAG and JMF, 1 ♂.

+ *Zealeuctra narfi* Ricker & Ross (IL, OO).

Suborder Systellognatha

Family Chloroperlidae

Subfamily Chloroperlinae

Alloperla caudata Frison.—Clark, Crawford, Floyd, Harrison, Jackson, Perry. This species is the most common *Alloperla* in southern Indiana.

* *Alloperla hamata* Surdick.—Floyd Co., tributary to Knob Creek, 17 km E Corydon, BSNP, 17 May 2000, SAG, 1 ♂, 2 ♀; Jackson Co., Little Salt Creek, 7 km NNW Free-town, 25 May 2002, SAG, 1 ♂, same but 11 May 2003, SAG, 4 ♂. This species is sparsely distributed in the eastern United States, with previous records from the Ozark-Ouachita Mountain region (Poulton and Stewart 1991) east to Alabama (Surdick 1981) and Kentucky (Kondratieff and Kirchner 1988).

Haploperla brevis (Banks).—Crawford, Jackson, Parke, Perry.

* *Sweltsa onkos* (Ricker).—Crawford Co., tributary to Otter Creek, 1 km SE Taswell, YBRNP, 17 May 2000, SAG, 9 ♂, 31 ♀. This species is mainly Appalachian, distributed from Ontario east to Quebec and the Canadian Maritime provinces, south to Kentucky, North Carolina, and Virginia. This record represents the western limit of its range.

Family Perlidae

Subfamily Acroneuriinae

Acroneuria abnormis (Newman).—Dubois, Martin, Monroe, Owen, Pike, Pulaski, Tippecanoe.

Acroneuria covelli Grubbs & Stark.—Floyd, Harrison, Martin. New Albany (Floyd Co., Ohio River) is the type locality of this recently described species (Grubbs and Stark 2004).

Acroneuria evoluta Klapalek.—Clark, Dubois, Monroe, Pike, Tippecanoe, Vanderburgh.

Acroneuria filicis Frison.—Tippecanoe.

Acroneuria frisoni Stark & Brown.—Clark, Crawford, Fountain, Harrison, Koscuisko, Lawrence, Monroe, Montgomery, Owen, Pike, Ripley, Tippecanoe.

Acroneuria internata (Walker).—Harrison, Parke, Tippecanoe.

Acroneuria perplexa Frison.—Clark, Dubois, Knox, Lawrence, Monroe, Owen, Pike, Tippecanoe, Vanderburgh.

Attaneuria ruralis (Hagen).—Monroe, Tippecanoe.

* *Perlesta adena* Stark.—Clark Co., tributary to Silver Creek, 22 km ESE Salem, CSF, 10 June 2000, SAG, 2 ♂, 3 ♀; Floyd Co., tributary to Knob Creek, 17 km E Corydon, BSNP, 17 May 2000, SAG, 7 ♂, 3 ♀; Jackson Co., tributary to Little Salt Creek, 7 km WSW Waymansville, HNF, 11 June 2000, SAG, 2 ♂, 1 ♀, 13 nymphs; Monroe Co., tributary to Clear Creek, 3 km NW Harrodsburg, Cedar Bluff Nature Preserve, 11 June 2000, SAG, 1 ♂; Orange Co., Carters Creek, 5 km W Campbellsburg, 10 June 2000, SAG, 2 ♂, 6 ♀; Ripley Co., Falling Timber Creek, near Versailles, Falling Timber Nature Preserve, 10 June 2000, SAG, 2 ♂. This species was described from the Cincinnati Arch area in southwestern Ohio (Stark 1989) and is the most common perlid in small, intermittent streams in southern Indiana.

+ *Perlesta cinctipes* (Banks) (IL, OH, OO).

* *Perlesta decipiens* (Walsh).—Bartholomew Co., East Fork White River, Azalia Bridge, 1.5 km SW Azalia, 11 June 2000, SAG, 7 ♂, 6 ♀; Harrison Co., Blue River, 6 km NE Leavenworth, HCSF, 18 May 2000, SAG, 15 ♂, 7 ♀.

+ *Perlesta golconda* DeWalt & Stark (IL).

+ *Perlesta lagoi* Stark (IL).

* *Perlesta napacola* DeWalt.—Harrison Co., Buck Creek, 10 km SE Corydon, 9 June 2000, SAG, 3 ♂; Jackson Co., Guthrie Creek, 18 km E Bedford, HBNP, 10 June 2000, SAG, 5 ♂, 4 ♀. This species was recently described from east-central Illinois (DeWalt 2002).

* *Perlesta nitida* (Banks).—Crawford Co., Little Blue River, 3 km N Sulphur, HNF, 9 June 2000, SAG, 1 ♂, 1 ♀; Harrison Co., Buck Creek, 10 km SE Corydon, 9 June 2000, SAG, 1 ♂, 9 ♀; Jackson Co., Guthrie Creek, 18 km E Bedford, HBNP, 10 June 2000, SAG, 2 ♂, 1 ♀.

Notes.—These records represent the western limit of its range. *Perlesta nitida* has been recorded from Connecticut and Massachusetts southwest through Pennsylvania, Ohio, and south-central Kentucky (Stark 1989; Grubbs and Stark 2001).

+ *Perlesta shubuta* Stark (IL, OO).

+ *Perlesta xube* Stark & Rhodes (IL).

Perlinella drymo (Newman).—Bartholomew, Crawford, Daviess, Dubois, Fulton, Jackson, Martin, Monroe, Parke, Perry, Pike, Tippecanoe.

Perlinella ephyre (Newman).—Bartholomew, Daviess, Dubois, Harrison, Monroe.

Subfamily Perlinae

* *Agnentina annulipes* (Hagen).—Harrison Co., Blue River, 6 km NE Leavenworth, HCSF, 9 June 2000, SAG, 1 ♂; Pike Co., White River, Petersburg, 13 June 1936, Mohr and Burks, 1 ♂, 1 ♀ (reared) (INHS). This species has a coastal distribution in Pennsylvania and Maryland, south to Florida, and east to Mississippi and Louisiana (Stark 1986). These records represent a northern range extension from the western Gulf Coast.

+ *Agnentina capitata* (Pictet) (IL, KY, OO, MI).—There are several vials of specimens at INHS labeled as *Phasganophora capitata* and electronically indicated as *A. capitata* (INHS 2002). All material exam-

ined were nymphs that could not be reliably identified to species. Continued collecting efforts may uncover populations of this common species, yet likely only from the northern tier of the state.

Agnentina flavescens (Walsh).—Elkhart, Harrison, Owen.

* *Neoperla catharae* Stark & Baumann.—Harrison Co., Blue River, 6 km NE Leavenworth, HCSF, 6 August 2000, SAG and DEG, 1 ♂, 1 ♀.

* *Neoperla clymene* (Newman).—Daviess Co., East Fork White River, 14 km S Washington, 31 May 2001, SAG and DEG, 2 ♂, 3 ♀; Harrison Co., Blue River, 6 km NE Leavenworth, HCSF, 9 June 2000, SAG, 2 ♀; Pike Co., White River, Petersburg, 4 June 1936, Mohr and Burks, 2 ♂ (INHS).

Neoperla gaufini Stark & Baumann.—Harrison, Jackson, Jefferson, Owen.

+ *Neoperla harpi* Ernst & Stewart (IL, OO).

+ *Neoperla mainensis* (Banks) (IL, OH).

Neoperla occipitalis (Pictet).—No literature records or museum material have been located and fresh specimens have not been collected, although it has been reported from adjacent Illinois, Kentucky, and Ohio. Only Stark (2001) listed *N. occipitalis* from Indiana.

* *Neoperla osage* Stark & Lentz.—Harrison Co., Ohio River, Leavenworth, 28 June 2002, SAG, 2 ♂. This species is widespread within the Ozark-Ouachita Mountain region (Poulton and Stewart 1991). This record indicates a slight eastern range extension.

+ *Neoperla robisoni* Poulton & Stewart (IL, OO).

* *Neoperla stewarti* Stark & Baumann.—Harrison Co., Blue River, 6 km NE Leavenworth, HCSF, 9 June 2000, SAG, 4 ♂, 5 ♀.

Paragnetina kansensis (Banks).—Dubois, Monroe, Pike, Tippecanoe.

Paragnetina media (Walker).—No literature records or museum material have been located and fresh specimens have not

been collected. This species is distributed widely throughout eastern North America including adjacent Illinois, Kentucky, Michigan, and Ohio. Bednarik and McCafferty (1977), Stark (2001), Stark et al. (1986), and Stewart and Stark (2002) each listed this species from Indiana. I have collected *P. media* from a tributary (Dowagiac Creek) to the St. Joseph River in Berrien County, Michigan, a county that straddles the Indiana-Michigan border. Collecting in the northern part of the state will likely reveal populations of this species.

Family Perlodidae
Subfamily Isoperlinae

Clioperla clio (Newman).—Clark, Crawford, Fountain, Knox, Lawrence, Martin, Monroe, Montgomery, Parke, Pike, Tippecanoe.

Isoperla bilineata (Say).—Clark, Floyd, Fulton, Daviess, Dubois, Martin, Monroe, Owen, Perry, Pike, Posey, Tippecanoe, Washington.

Isoperla burksi Frison.—Monroe.

Isoperla decepta Frison.—Brown, Clark, Crawford, Dearborn, Dubois, Floyd, Franklin, Harrison, Jackson, Jefferson, Monroe, Morgan, Ohio, Perry, Pike, Ripley, Tippecanoe. This species is the most common *Isoperla* in intermittent streams in southern Indiana.

Isoperla dicala Frison.—Floyd, Starke.

Isoperla frisoni Illies.—Starke.

+ *Isoperla longiseta* Banks (IL).

Isoperla marlynia (Needham & Claassen).—Pike.

+ *Isoperla mohri* Frison (IL, OO).

Isoperla namata Frison.—Monroe, Owen.

Isoperla nana (Walsh).—Bartholomew, Kosciusko, Tippecanoe.

+ *Isoperla richardsoni* Frison (IL, KY).

+ *Isoperla signata* (Banks) (MI, OO).

Subfamily Perlodinae

Diploperla robusta Stark & Gaufin.—Clark, Floyd, Harrison, Jefferson, Parke, Ripley.

Helopicus nalatus (Frison).—Although Ricker (1952) indicated a “southern Michigan to southern Indiana” distribution for *H. nalatus*, no county records or museum material have been located in the literature and I have not collected fresh specimens. Bednarik and McCafferty (1977), Stark (2001), Stark et al. (1986), and Stewart and Stark (2002) listed this species from Indiana.

Hydroperla crosbyi (Needham & Claassen).—Owen, Morgan, Tippecanoe.

Hydroperla fugitans (Needham & Claassen).—Posey, Tippecanoe. The Posey County record refers to recently collected material (Wabash River, 8 km SSW New Harmony, Harmonie State Park, 8 April 2001, SAG and JMF, 1 ♂).

Isogenoides varians (Walsh).—Dubois, Pike, Tippecanoe. Similar to *Nemocapnia carolina*, with the exception of the Tippecanoe County locality, this species has been collected only from the White River. Recent trips have failed to produce fresh material.

Family Pteronarcyidae

Pteronarcys dorsata (Say).—“Elkhart”. The Elkhart record was documented by Nelson and Hanson (1971) and likely refers to either the Elkhart or St. Joseph River in north-central Indiana.

Pteronarcys pictetti Hagen.—Fountain, Martin, Monroe, Morgan, Pike, Tippecanoe.

SPECIES REMOVED FROM INDIANA LIST

Six species, *Allocapnia minima* (Newport), *Allocapnia pygmaea* (Burmeister), *Leuctra tenella* Provancher, *Alloperla atlantica* Baumann, *Alloperla imbecilla* (Say), and *Sweltsa naica* (Provancher) are removed from the state list. The previously published records of *Allocapnia minima* from Indiana (e.g., Stark et al. 1986) were likely in error. Ross and Ricker (1971), Finni (1973a), and Bednarik and McCafferty (1977) did not report this species from Indiana. This species is distributed mainly throughout the northern Great Lakes region

and eastward to New England and the Canadian Maritime provinces.

There are no confirmed records of *Allocapnia pygmaea* from Indiana. All previously published county records (Frison 1942, Ricker 1945) and state records (e.g., Finni 1973a, Stewart and Stark 2002) are likely of *A. nivicola*. *Allocapnia pygmaea* is widely distributed throughout the upper Great Lakes and Appalachian regions with relict populations in Missouri (Poulton and Stewart 1991).

Bednarik and McCafferty (1977) listed *Leuctra tenella* from Indiana, but its inclusion was based on nymphs. *Leuctra tenella* displays an Appalachian distribution with a westward expansion to Wisconsin and Minnesota. Nymphs of *Leuctra* are difficult to identify to species despite the taxonomic treatment by Harper and Hynes (1971). Examination of nymphs labeled as *L. tenella* housed at PU was inconclusive.

Stark (2001), Stark et al. (1986), and Stewart and Stark (2002) listed *Alloperla atlantica* from Indiana. Bednarik and McCafferty (1977) listed this species from Indiana based on Baumann (1974). Baumann (1974), however, did not include Indiana in his description of *A. atlantica*. This species displays an Appalachian-upper Piedmont distribution with a westward swing through the upper Great Lakes region.

Bednarik and McCafferty (1977), Stark (2001), Stark et al. (1986), and Stewart and Stark (2002) each listed *Alloperla imbecilla* from Indiana. This species displays an Appalachian distribution from Quebec south to West Virginia and Virginia. Surdick (1985) did not study Indiana material of *A. atlantica* or *A. imbecilla* in her review of choroperline genera. Additionally, Baumann (1974) did not study Indiana material of this species in his comparative analysis with *A. atlantica*.

Sweltsa naica is mainly a central/northern Appalachian species, with relict populations in Virginia (Kondratieff and Kirchner 1987), and a highly unlikely member of

Table 1. Species richness counts of stoneflies in Indiana by six-digit hydrologic unit codes. Species records include recent collections by the author, reliable literature, and examined museum material.

Hydrologic Unit Code	Code Number	Species Richness
Southwestern Lake Michigan	040400	1
Southeastern Lake Michigan	040500	2
Western Lake Erie	041000	0
Great Miami	050800	5
Middle Ohio—Little Miami	050902	14
Wabash	051201	36
Patoka—White	051202	58
Lower Ohio—Salt	051401	47
Lower Ohio	051402	17
Upper Illinois	071200	4

the Indiana fauna. Bednarik and McCafferty 1977 listed this species from Indiana based on a poorly preserved female. Although I have been unable to find the specimen labeled as *S. naica* to make a definitive determination, its identity is likely *S. onkos*.

DISCUSSION

The comparatively higher species diversity values (Table 1) of the Patoka-White (051202) and Lower Ohio-Salt (051401) hydrologic units may reflect the collecting efforts during years 2000–2003. All collecting trips for this study were directed at unglaciated landscapes (Fig. 1). The opposite trend is realized with the Southeastern Lake Michigan (040500) and Western Lake Erie (041000) hydrologic units. In total, the four 'northern' units (Southwestern Lake Michigan, 040400; Southeastern Lake Michigan; Western Lake Erie; Upper Illinois, 071200) supported six species total. There is a dearth of museum and literature stonefly records for these four units. However, the third-highest diversity was supported in the Wabash hydrologic unit (051201), and this area was unvisited during this study. Whether these regional patterns of species richness are a reflection of (a) size, (b) collecting frequency, (c) anthropogenic disturbance, or (d) historical

factors remains to be addressed. Alternatively, two additional grouping approaches need to be addressed: Level III/IV Ecoregions (Woods et al. 1998) and Homoya's Natural Regions (Homoya et al. 1984). Concerted collecting in the northern half of Indiana and a comparative assessment of the three landscape classification schemes will be required.

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